

# Document made available under the Patent Cooperation Treaty (PCT)

International application number: PCT/AU05/000123

International filing date: 01 February 2005 (01.02.2005)

Document type: Certified copy of priority document

Document details: Country/Office: AU  
Number: 2004900445  
Filing date: 02 February 2004 (02.02.2004)

Date of receipt at the International Bureau: 08 March 2005 (08.03.2005)

Remark: Priority document submitted or transmitted to the International Bureau in compliance with Rule 17.1(a) or (b)



World Intellectual Property Organization (WIPO) - Geneva, Switzerland  
Organisation Mondiale de la Propriété Intellectuelle (OMPI) - Genève, Suisse



PCT/AU2005/000123

Australian Government

Patent Office  
Canberra

I, JANENE PEISKER, TEAM LEADER EXAMINATION SUPPORT AND SALES hereby certify that annexed is a true copy of the Provisional specification in connection with Application No. VELOCITY BICYCLE ACCESSORIES PTY LTD for a patent by 2004900445 as filed on 02 February 2004.



WITNESS my hand this  
Third day of March 2005

A handwritten signature in dark ink, appearing to read 'J. Peisker'.

JANENE PEISKER  
TEAM LEADER EXAMINATION  
SUPPORT AND SALES

P/00/009  
Regulation 3.2

AUSTRALIA

---

*Patents Act 1990*

---

## PROVISIONAL SPECIFICATION

Invention Title: "WHEEL RIM"

The invention is described in the following statement:

TITLE

"WHEEL RIM"

FIELD OF THE INVENTION

THIS INVENTION relates to a rim for a wheel such as a bicycle rim, in particular a bicycle rim connected to a central hub by spokes.

BACKGROUND OF THE INVENTION

A typical spoked wheel, such as a bicycle wheel, comprises an outer rim, a central hub and spokes connecting the rim and hub. A common spoke comprises two ends, one end is threaded and is capable of being threaded onto a spoke nipple and another end is non-threaded and terminates either with a bent hook or a straight head. The rim commonly comprises a channel for attaching a tire.

A common rim comprises a row of openings drilled along the channel to seat spoke nipples therein. Spokes are threaded onto each nipple and at an opposite non-threaded end of the spoke may be bent to form a hook or may be straight and end in a head that attaches to the hub. Tension of the spoke may be adjusted by turning the threaded nipple relative to the threaded spoke, to thereby "true" the wheel. The nipple extends through the opening in the rim such that a head of the nipple faces outward from the wheel. A nipple wrench may engage a side of the nipple or a screw driver or nipple driver to be used to adjust the tension of the spoke.

The number of openings drilled into the rim determines the number of spokes for the wheel. The number of spokes, may be different for each rim, for example, a wheel may have 36 spokes, 32 spokes, 24 spokes

or 20 spokes, however the total number of spokes is predetermined and fixed. Generally, fewer spokes is desired to reduce weight to thereby increase the speed a cyclist may travel. However, with fewer spokes, the wheel generally is weaker or is more expensive as stronger materials are required to reinforce the wheel. Also, the number of spokes for the wheel must match the number of opening in the rim and hub. If a cyclist has a hub that attaches to 20 spokes and has a spare rim having 36 openings for receiving spoke nipples, the hub and rim are not compatible and a new hub or rim needs to be purchased. Also, the angle of the spokes relative to the rim is fixed for a particular rim. A cross sectional shape of a rim may limit the angle of the spokes.

Some wheels use a tubeless tire that does not require an inner tube. Such a tire is lighter in weight, reduces risk of puncture due to pinching of the inner tube against the tire and if an object penetrates the tire, it often is temporarily self-sealing to allow the cyclist to complete their journey. However, use of a standard rim with a tubeless tire is problematic in that the opening the rim for seating the spoke nipples provides a location for passage of air to leak out from the tire.

One known rim overcomes this problem by not drilling openings in the rim and instead secures the spoke nipple within individual openings located within an extension of the rim facing the hub. This known rim essentially locates the standard openings in the rim in a structure adjacent to the rim. Spokes are attached to the rim by placing a collar around each spoke nipple and forcing the collar into each of the individual openings in the

extension of the rim. This rim, like standard rims, has fixed number of openings for receiving a predetermined number of spoke nipples.

There is a need for a rim that may accommodate different number of spokes, different spoke angles and suitable for use with a  
5 tubeless tyre.

#### SUMMARY OF THE INVENTION

It is an object of the invention to overcome one or more of the limitations of, or improve upon, the abovementioned background art or to provide a useful alternative.

10 In a first aspect the invention provides wheel rim comprising:

- (a) a circular endless band; and
- (b) at least one track located on an inner surface of the circular  
endless band that is adapted to receive an end of a spoke.

Preferably, the wheel rim is a bicycle wheel rim.

15 Preferably, the circular endless band comprises an outer surface adapted to retain a tire.

Preferably, the outer surface comprises a channel.

The channel in one form is adapted to retain a clincher-type  
tire.

20 Preferably, the end of the spoke is capable of sliding relative to the track.

The at least one track in one form comprises a bar adapted to receive and retain the end of the spoke.

Preferably, the bar receives and retains a hook end of the

spoke.

The at least one track in another form comprises a groove adapted to receive and retain at least one carriage capable of attaching to and end of a spoke.

5 In one form the carriage is capable of attaching to a threaded end of the spoke.

The carriage may comprise a spoke nipple.

The carriage in another form is capable of attaching to a non-threaded end of the spoke.

10 The non-threaded end of the spoke may comprise a hook.

The non-threaded end of the spoke may comprise a flat head.

The track in still another form may comprise an outward extension that is adapted to receive the carriage.

Preferably, the outward extension is T-shaped.

15 The track in yet another form may comprise at least one channel located on an outer surface of each sidewall of the circular endless band.

The carriage in still another form is adapted to receive and retain a spoke nipple.

20 The carriage preferably is capable of sliding relative to the track.

The rim of the first aspect may further comprise a cover attachable to the track.

Preferably, the cover is arcuate in shape.

The cover is preferably a spacer locatable on the track between adjacent carriages.

In one form, the circular endless band comprises a single track.

Preferably, the single track extends substantially along an  
5 entire length of the inner surface of the circular endless band.

In another form the circular endless band comprises a plurality of tracks.

Preferably, the plurality of tracks are equally spaced along a circumference of the inner surface of the circular endless band.

10 In a second aspect the invention provides a wheel comprising:

- (1) a rim of the first aspect;
- (2) a plurality of spokes attached to and extending inwardly from the rim; and
- (3) a hub located central of the wheel and connected to the rim by  
15 said plurality of spokes.

The wheel may further comprise a tire located at an outer surface of the rim.

In one form, the tire further comprises an inner tube located within the tire.

20 In another form, the tire is a tubeless tire.

The tubeless tire may be a clincher-type tubeless tire or a sew-up tire (also referred to as a "single").

In a third aspect, the invention provides a method for attaching at least one spoke to a wheel rim, including the step of attaching an end of



each of the at least one spoke to a track located on an inner surface of a continuous endless band of the rim, wherein the end of the spoke when attached to the track is slidable relative thereto.

The end of the at least one spoke may be either a threaded  
5 end or a non-threaded end.

The method in one form may further include the step of attaching a carriage to the track and attaching the spoke to the carriage.

The method in another form may alternatively include the step of attaching the spoke to the carriage and attaching the carriage to the track.

10 The method preferably further includes the step of attaching one or more spacers on the track between adjacent carriages.

The method preferably further includes the step of attaching an end of the spoke not attached to the track to a hub.

In a fourth aspect, the invention provides a kit for constructing a  
15 wheel rim comprising:

- (i) a rim comprising at least one track;
- (ii) a plurality of carriages locatable on the track; and
- (iii) a plurality of spacers locatable on the track.

The kit preferably further comprises:

- 20 (iv) a hub adapted to attach a plurality of spokes; and
- (v) a plurality of spokes respectively attachable to one or more carriage(s) and the hub.

The carriage may be adapted to attach to one or more spokes.

In one form, the carriage is adapted to attach to a single spoke.

Throughout this specification unless the context requires otherwise, the word "comprise", and variations such as "comprises" or "comprising", will be understood to imply the inclusion of the stated integers or group of integers or steps but not the exclusion of any other integer or group of integers.

#### BRIEF DESCRIPTION OF THE DRAWINGS

In order that the invention may be readily understood and put into practical effect, preferred embodiments will now be described by way of example with reference to the accompanying drawings wherein like reference numerals refer to like parts and wherein:

FIG. 1A is a cross sectional view of one embodiment of a rim of the invention comprising a track adapted to attach a nipple of a spoke;

FIG. 1B is the rim shown in FIG. 1 with a spoke and tire attached to the spoke.

FIG. 2 is a cross sectional view of one embodiment of a rim of the invention comprising a track adapted to attach a hook of a spoke;

FIG. 3 is a side view of a rim shown in FIG. 2;

FIG. 4 is a cross sectional view of one embodiment of a rim of the invention comprising a track adapted to attach a collar that retains a nipple of a spoke;

FIG. 5 is a cross sectional view of an embodiment of a rim comprising a track located on sidewalls of the rim;

FIG. 6 is a cut away isometric view of a carriage adapted to retain a spoke nipple;

FIG. 7 is a cross sectional view of another embodiment of a rim of the invention comprising a track adapted to attach a carriage that retains a nipple of a spoke;

FIG. 8A is cross sectional view of a carriage for retaining a hook end of a spoke;

FIG. 8B is a cross sectional view of a carriage for retaining a non-threaded flat head portion of a straight spoke;

FIG. 9A is a cross sectional view of another embodiment of a carriage for retaining a hook end of a spoke;

FIG. 9B is a cross sectional view of another embodiment of a carriage for retaining a non-threaded flat head portion of a straight spoke;

FIG. 10A is a side view of a wheel comprising a single track;

FIG. 10B is a side view of a wheel comprising four tracks;

FIG. 10C is a side view of a wheel comprising three tracks;

FIG. 11A shows the cross sectional view of the rim shown in FIG. 4 with a cover (shown as a spacer) attached to the track; and

FIG. 11B shows the rim of FIG. 11A with a carriage and spoke attached to the rim.

#### DETAILED DESCRIPTION OF THE INVENTION

The invention in one embodiment generally relates to a wheel rim shown in FIGS. 1A and 1B as a bicycle rim comprising a circular endless band 13 having a channel 20 located at an outer surface 11 of the band 13 and a track 30 located on an inner surface 12 of the band 13.

The channel 20 comprises sidewalls 21 each terminating in a

flange 22 for securing a clincher-type tire 23 that is common for many bicycle tires. The clincher-type tire comprises a continuous circular metal band 26 that seats against the flange 22.

The track 30 comprises a pair of opposed sidewalls 31 defining a  
5 groove 32 adapted to receive a carriage, shown as a spoke nipple 41 that attaches to a threaded end 44 of a spoke 40, shown in FIG. 1B. The band 13 is shown as a mid-section of a typical rim; however, it will be appreciated that the band may have any suitable shape and cross-section as is well known in the art. For example, the shape of the mid-section may be V-  
10 shaped, curved, or substantially flat. Some rims omit the mid-section and have a single curved band. Further, a sew-up type tire (also known as a "single") may omit sidewalls 12 and flanges 22 as the tire is not attached to the rim via a clinching mechanism on the tire.

FIG. 2 shows another embodiment of the invention wherein the rim  
15 200 comprises a track 230 that supports the hook 43 of a spoke 40. The track 230 comprises a support 231 shown in FIG. 3 that supports a bar 232 on which respective hooks 43 of each spoke 40 rests. Spokes of a wheel attached to the rim shown in FIGS. 2 and 3 are slideable relative to the track 230 and are securely attached to the track (i.e. prevented from sliding) when  
20 tension is applied to each spoke by tightening the nipple relative to the spoke. The bar 232 in one embodiment comprises indentations 233 to retain the hook 43 of the spoke 40. In another embodiment, the bar 232 comprises raised portions 234 for retaining the hook 43 of the spoke 40 therebetween.

For each of the embodiments shown in FIGS. 1-3, the end of the

spoke is capable of sliding relative to the track, either with or without a carriage, before the spoke is tightened between the rim and a centrally located hub. This provides an easy means for changing a number of spokes for the wheel and allows for easy adjustment of spacing between adjacent spokes before tightening thereof.

FIG. 4 shows an embodiment of the invention wherein a rim 300 comprises a track 330 that is adapted to receive a carriage 50 that is adapted to retain a spoke nipple 41. The carriage, with spoke retained thereby, is slideable relative to the track 330. The track 330 is shown as a groove 335 having sidewalls 331 and retaining flanges 332 extending perpendicular to each sidewall 331. The sidewalls 331 and retaining flanges 332 define the groove 335 for carriage 50 to slide therein.

FIG. 5 shows an embodiment of the invention wherein the rim 500 comprising a track 530 in the form of a pair of grooves 531 located on sidewalls 21 as shown. A carriage 550 slides within the track 530 by tongue 553 of the carriage 550 being capable of sliding within the grooves 531. The carriage is similar to the carriage 50 having a similar base 551 and collar 552 for retaining spoke nipple 41.

The carriage 50 shown, shown in isolation in FIG. 6, comprises a base 51 and a collar 52 that is adapted to receive the nipple 41 of a spoke 40. The base 51 comprises a tongue 53 that is capable of sliding within groove 335 of the track 330 shown in FIG. 4. The base 51 is shown square, however, it will be appreciated that other shapes of the base 51 are contemplated, for example rectangular, round, oval, triangular, or any other

suitable shape that a person skilled in the art may select. For example, if the carriage is to be capable of rotation, the base may be circular, or if the carriage is not rotatable, the base may be square. One form of the carriage may have one pair of corners diagonal to each other that are rounded and another pair of corners diagonal to each other square so that the carriage  
5 may be rotated in one direction. The collar 52 is shown as a cross sectional view in FIG. 6 wherein the collar comprises a recess 54 that completely surrounds the nipple. However, in another embodiment the collar 52 comprises an open end or ends so that the spoke nipple may be slide into  
10 the recess 54. Also, the base 51 may comprise grooves or serrations on one or more surfaces contacting the track to increase friction therebetween and reduce unintentional movement of the carriage 50 relative to the track.

It will be appreciated that in one embodiment of the invention, the track may comprise a liner (not shown) that substantially extends an entire  
15 length of the track and is adapted to retain at least one spoke nipple. The liner preferably has a cross sectional shape identical or similar to the carriage 50. Accordingly, for such an embodiment, the liner may replace the carriage 50.

It will also be appreciated that the embodiment shown in FIGS. 1A  
20 and 1B in one form is similar to the abovementioned embodiment of the track comprising a liner, however, the track and liner form a single structure.

FIG. 7 shows another embodiment of the invention wherein a rim 400 comprises a track 430 having an outward projection of a T-shaped cross section. The carriage 450 is capable of sliding relative to the track 430 along

groove 455. The groove 455 is formed by a pair of opposed sidewalls 451, each having a flange 452 extending perpendicular to each sidewall 451. A collar 453 extends away from a surface of the carriage 450 as shown and the collar 453 is adapted to receive a spoke nipple 41 of a spoke 40.

5           Another form of a carriage suitable for use with the track 430 of FIG. 4 is shown in FIGS. 8A and 8B. FIG. 8A shows a carriage 250 adapted to receive a spoke 40 comprising a bent hook end 43. The carriage 250 comprises a base 251 and a member 252 extending way from the base 251. The member 252 comprises at least one aperture 253 adapted to receive a  
10   hook 43 of a spoke 40. The carriage 250 is similar to the carriage 50 shown in FIG. 6, however, the collar is replaced with the member 252. The aperture 253 may be circular as shown, or may in another form comprise an elongate slit. It will be appreciated that an elongate slit may provide an additional means for adjusting a location of the spoke end relative to the rim 10 as will  
15   be described in more detail hereinafter.

The base 251 comprises a tongue 254 that is capable of sliding within the groove 335 of track 330 as shown in FIG. 4.

FIG. 8B shows another embodiment of a carriage 255 that is adapted to receive a head of an end of a straight spoke 40 opposite a  
20   threaded end that engages a nipple. The carriage 255 comprises a base 256 comprising an aperture 257 that is adapted to receive a head portion 42 of the straight spoke 40a. The base 256 comprises a tongue 258 as shown that is capable of sliding within groove 335 of the track 330 shown in FIG. 4 in a similar manner as the carriage 50.

FIG. 9A shows another form of a carriage 350 comprising a groove 355 similar to that shown for carriage 450 in FIG. 7. However, the carriage 350 comprises a member 352 that comprises an aperture 353 that is adapted to receive a hook 43 of a spoke 40, similar to that shown in FIG. 8A.

5 The aperture 353 is shown circular, but the aperture 353 may have other shapes such as an elongate slit.

FIG. 9B shows an embodiment of a carriage 351 that is similar to the carriages shown in FIGS. 8B and 9A in that the carriage 351 comprises an aperture 354 for engaging an head portion 42 of a straight spoke 40a and  
10 a groove 355 for engaging the track comprising a substantially T-shape.

FIG. 10A shows a wheel 60 comprising a single track 330 extending along the inner surface 12 of the rim 300, a tire is not shown. Track 330 may accommodate any suitable number of spokes 40. For this embodiment, a gap 25 is formed at ends of the track 330 adjacent to an  
15 aperture 24 through which an air valve of a tire may be inserted. For a tubeless tire, the air valve may comprise o-rings or other suitable sealing means located around the valve to prevent unwanted air loss from within the tire. The gap 25 also provides a location for inserting the carriage(s) onto the track 330.

20 Spacers 510 may be located on track 330 between adjacent carriages 50. The spacers 510 fill in spaces on the track 330 between carriages 50, which may further prevent inadvertent sliding of the carriage 50, reduce wind resistance, prevent debris from entering the track and may improve aesthetics. The spacers may also comprise covers 600 as shown in



## FIG. 11.

It will be appreciated that the spacers 510 are of a suitable length so that a distance between adjacent carriages 50, and spokes 40 or 40a attached thereto, are of a desired separated length. The spacers 510 are each shown as a single contiguous member between adjacent carriages 50.  
5 However, it is contemplated that a plurality of spacers may be located between adjacent carriages 50. Accordingly, a distance separating adjacent carriages 50 may be predetermined by a user and an appropriate length spacer, or plurality of spacers, located onto the track 330.

10 Also, each carriage may be adapted to retain one or more spokes. For example, FIG. 10A shows carriage 50 adapted to retain a single spoke 40 and carriages 50a shown in FIGS. 10B and 10C are adapted to retain two spoke ends. Also contemplated are carriages adapted to retain three or more spoke ends. It will also be appreciated that in addition to typical  
15 spokes (e.g. straight spokes and hooked spokes), other support arms that extend between the rim and the hub may likewise be attached to a carriage and used in accordance with the invention. In alternative embodiments, the track 330 may be discontinuous as shown for wheels 61 and 62 in FIGS. 10B and 10C and accordingly comprise tracks 330a-330g. For embodiments of  
20 track 330 that are discontinuous, it is preferred that portions of the track 330 are located at equal distances along the inner surface 12 as shown in FIGS. 10B and 10C. It will be appreciated that other arrangements of the track 330 are possible as long as the carriages and/or spokes may engage and be retained by the track 330. The spacing of the track 330 may be determined

based in part on the number of spokes 40 located within the wheel. For example, if a single track 330 is substantially continuous (e.g. comprises a single gap between adjacent ends of the track 330 of sufficient size to allow for a spoke and/or carriage to be slide onto the track 330) as shown in FIG.

5 10A, any number of spokes may be used. If the rim comprises four tracks 330a-330d or three tracks 330e-330g, preferably an equal number of spokes are attached to each track 330a-30g. FIGS. 10A-10C merely show examples of possible spoke arrangements and other suitable arrangements are possible as a skilled person may select.

10 It will be appreciated that because the spokes 40 can slide along the track 330 within carriage 50 before tightening, the final number of spokes 40 attached to a wheel 60, 61, 62 may be varied. This allows for the number and type of spoke of the wheel to be changed without having to change rims.

The number of spokes and type of spokes may be changed to reduce  
15 weight or strengthen the wheel. Further, the number of spokes may be selected based on the number of spoke attachment openings of hub 70 without having to purchase a separate rim to match the predetermined number of spokes for the hub. This would be the case for a standard rim that has a fixed number of pre-drilled apertures for retaining nipples 41.

20 It will be appreciated that although embodiments of wheels 60, 61, 62 shown in FIGS. 10A-10C comprise a rim having a track 330, the other tracks referred to herein may be located on the rim in a same or similar manner as described for track 330. It is preferred that the track is sufficiently long to allow for the spoke, or carriage, to slide to a location allowing for a

proper arrangement of spokes relative to the rim.

FIGS. 11A and 11B show the rim of FIG. 4 comprising a cover 600. The cover 600 is shown arcuate or curved, however, other suitable shapes include teardrop shaped, triangular square or any other shape. The shape may be selected based on aerodynamics and/or aesthetics. The cover 600 may be reflective to improve visibility of the rim, for example to improve visibility when a cyclist is riding a bicycle with the rim of the invention.

The cover 600 attaches to the track 330 in a similar manner as carriage 50. The cover 600 comprises a tongue 53a that is capable of sliding within groove 335 of the track 330. In one embodiment, the cover 600 also functions as a spacer 510, as described for FIGS. 10A-10C. An end of the cover 600, or spacer 510, that is located adjacent to a carriage, and therefore adjacent to a spoke, preferably comprises an indentation 601, preferably the indentation 601 is arcuate in shape, or more preferably comprises a semi-circle. The indentation 601 enables the cover 600 (spacer 510), to extend around a spoke when two covers 600 or spacers 510 are located on opposite ends of the carriage.

In one embodiment, the cover may form part of the track as an integral part of the rim. For such an embodiment, a slit is located within the cover to allow the spokes to be slid onto the rim. The cover may be made of any suitable material, but is preferably light weight.

The spoke 40 may extend at any angle relative to the carriage or track. A suitable angle may be determined by a person skilled in the art, and

such an angle may in part be determined by the style of rim, number of spokes, type of spokes, type of hub and the like. It will be appreciated that a carriage may comprise a pre-formed angle for retaining the spoke or spoke nipple so that for a single rim a particular carriage and spoke angle may be selected. Accordingly, it will be appreciated that the present invention allows for a substantially greater number of angles of the spokes relative to the rim when compared with previously known rims. Many known rims comprise a cross sectional dimension (e.g. depth of the rim) that prohibits or limits the angle of the spoke relative to the rim. The carriage allows for angles of the spoke relative to the rim that were previously not possible. The angle of the spoke relative to the rim refers to both the angle in and out of the plan of the rim and also the angle within the plan of the rim. In one form, the collar may be rotatable relative to base or groove portion of the carriage.

It will be appreciated that the present invention is suitable for use with typical clincher tires, sew-up tires and tubeless tires. In relation to tubeless tires, the present invention is particularly well suited as there is no need to drill holes into the rim to accommodate the spoke nipples. Accordingly, the spoke nipples do not extend through the rim into the channel portion 20 where the tubeless tire is attached. This prevents possible leakage of air through hole of a typical rim.

For each of the embodiments of the invention, the spokes are firmly retained in place relative to the track when tension is applied to the spoke during typical lacing of a wheel, which tightens each spoke located between the rim and hub. Before the spoke is tightened, the spoke end may

be slide relative to the track. For example, the hook may slide relative to the bar, the spoke nibble may slide relative to the track or a carriage may slide relative to the track. It is contemplated that for embodiments of the invention comprising a carriage, the carriage may be slide onto the track and then the spoke attached to the carriage or alternatively the spoke may be attached to the carriage and the carriage, with the attached spoke, slide onto the track. In either embodiment, the spoke once attached to the track, either directly or indirectly via a carriage, is slideable relative to the track before the spoke is tightened.

10           The location of the spokes may be arranged by sliding the spoke relative to the track before tension is applied to the spoke. The circular endless band of the rim may optionally have indicators, or example a mark, on the rim to indicate a proper location for positioning a spoke. The rim may have different indicators for a different number of total spokes for the wheel.

15           For example a single line may indicate a spoke location for a wheel having 24 spokes and a double line may indicate a spoke location for a 32 spoke wheel. Preferably, the mark is visible, but faint as to not detract from the aesthetics of the rim. Alternatively, use of the spacers 510 removes the need for markings along the rim.

20           Because the spokes may be slide onto the track, either directly or indirectly via a carriage, the number of spokes for the wheel may vary depending on the wheel and hub. As such, a single rim may be mass produced and the number of spokes used to make the wheel later determined. This is an advantage over known rims that comprise a

predetermined fixed number of opening for receiving a fixed number of spoke nipples. Also, different rims are not required when changing the number of spokes for a wheel. Further, a hub has a predetermined fixed number of opening for receiving an end of a spoke. The present invention  
5 allows for a hub to be used with any rim as the rim may accommodate different numbers of spokes.

The present invention is ideal for use with common off the shelf components. For example, some hubs attach to spokes via the hook end, while other hubs attach to spoke via the nipple end. It will be appreciated  
10 that a suitable carriage as described herein may be used to accommodate either spoke end, thereby any kind of common hub may be used with the present invention. Accordingly, a single rim may be mass produced and the form of the carriage used for a particular hub design.

It will further be appreciated that the present invention may be  
15 used with most, if not all, presently available rim designs. That is, the track may be located on an inner surface of a rim having essentially any cross sectional profile. Accordingly, the rim of the invention may comprise a mid-section or other reinforcing structures, no reinforcing structure no mid-section. Also, the rim may be used with any wheel comprising spokes, for  
20 example wheels for a mountain bicycle, road bicycle, racing bicycle, wheel chair, unicycle, tricycle, car, trolley, cart, carriage, gear, spindle and the like.

It will be appreciated that for some embodiments of the invention, the track(s) may be formed integrally with the rim, for example as an extrusion. Alternatively, the tracks may be attached or mounted to the rim by

a fastening means, such as by welding, rivet, bolt, screw, adhesive and the like. Preferably, the track is formed as an extrusion to reduce manufacturing cost and time.

In one embodiment, the invention provides a kit comprising a rim  
5 comprising at least one track, a plurality of carriages and a plurality of  
spacers. A rim may be assembled by selecting carriages of appropriate  
configuration (e.g. capable of retaining a desired spoke design and end of  
spoke, comprising an appropriate angle for the spoke, etc), selecting a  
desired number and/or length of spacers and placing the carriages and  
10 spacers onto the track in a desired order so that spacing between carriages  
corresponds to a desired spoke number, spacing and angle relative to the  
rim. The kit may further comprise a hub and a plurality of spokes.

Although the invention has been shown and described with  
exemplary embodiments thereof, it should be understood by those skilled in  
15 the art that the foregoing and various other changes, omissions and  
additions may be made therein and thereto without departing from the scope  
of the invention.

DATED this Second day of February 2004

20 VELOCITY BICYCLE ACCESSORIES PTY LTD

By its Patent Attorneys

Fisher Adams Kelly

1/17

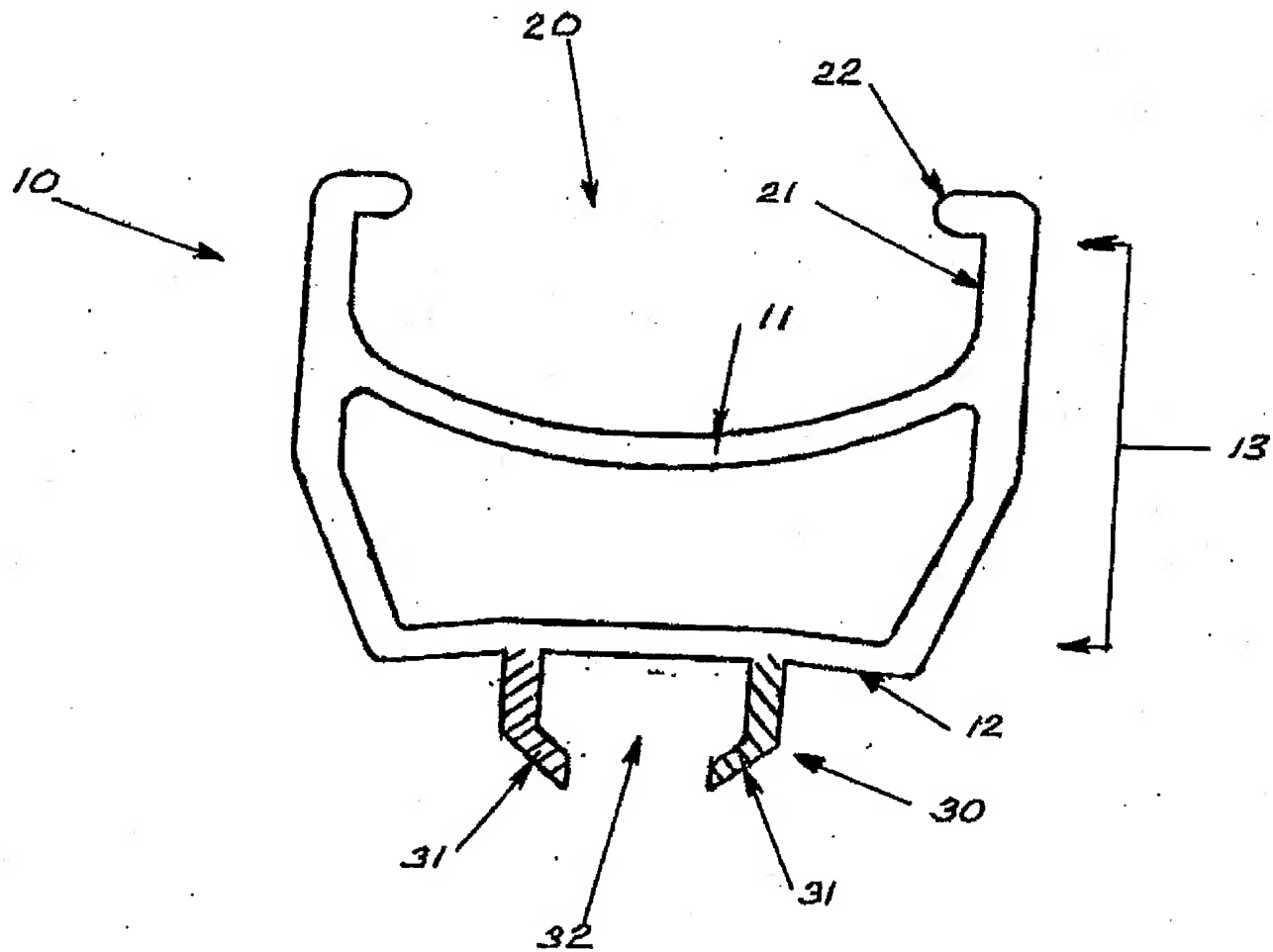
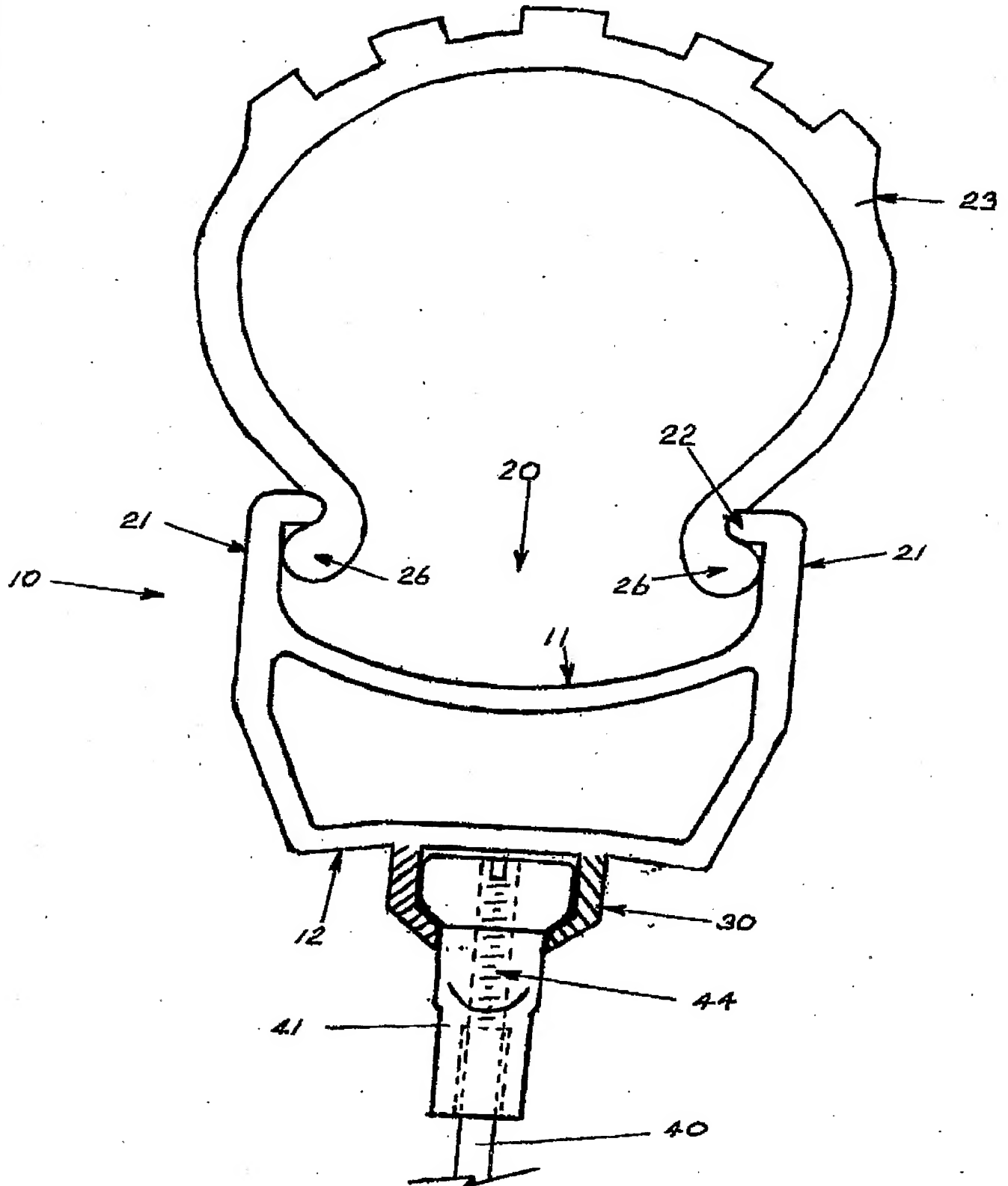


FIG. 1A



2/17

FIG 1B



3/17

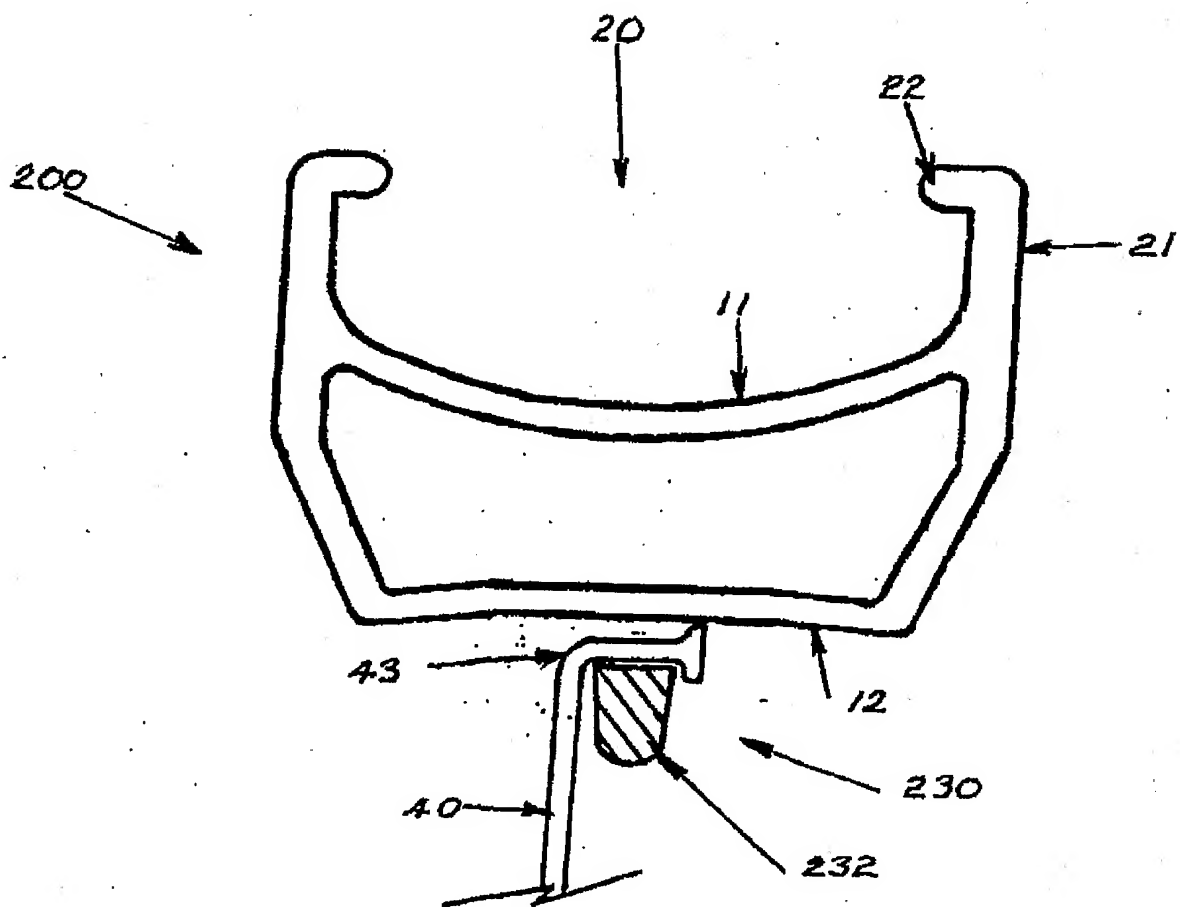
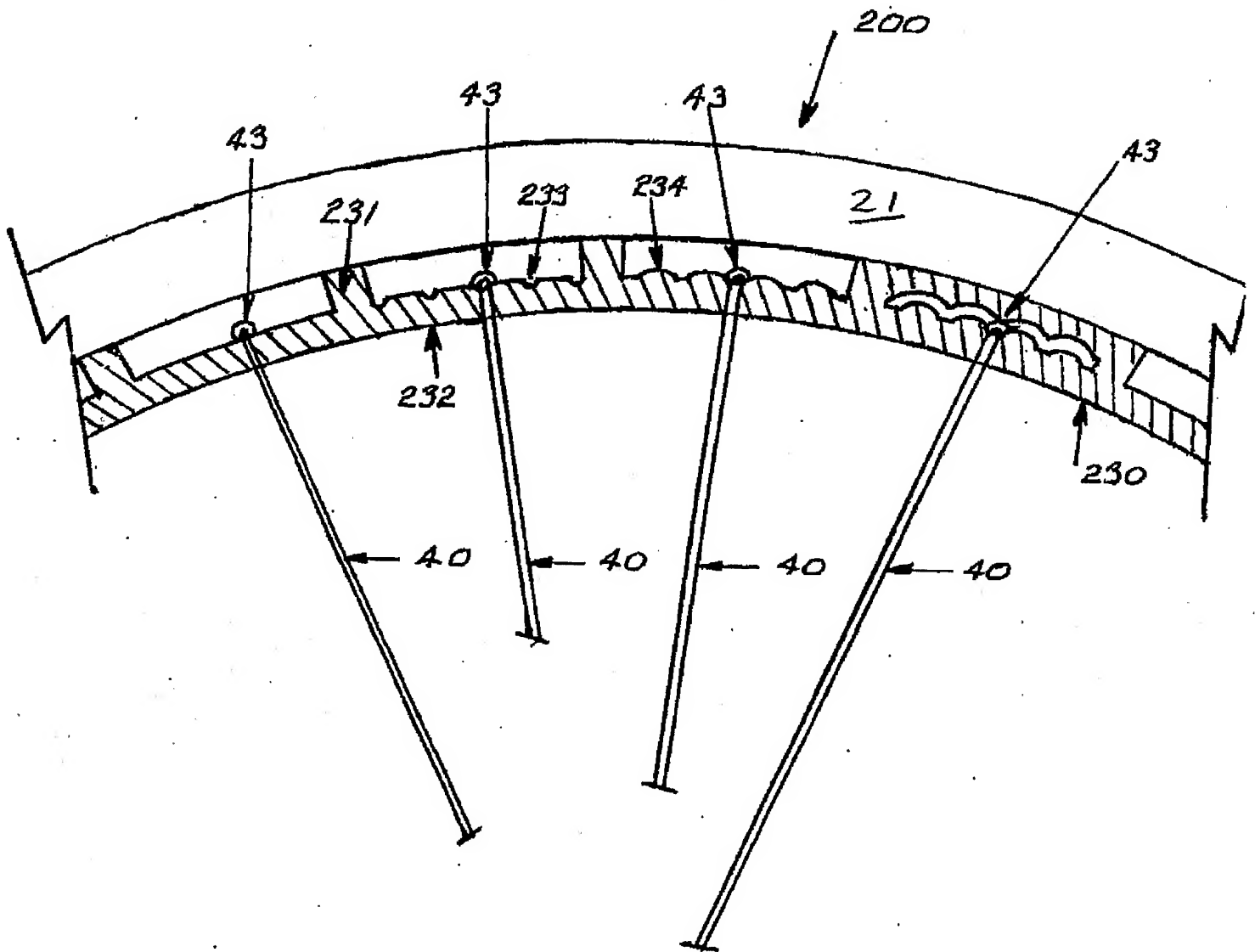


FIG. 2

4/17

FIG 3



5/17

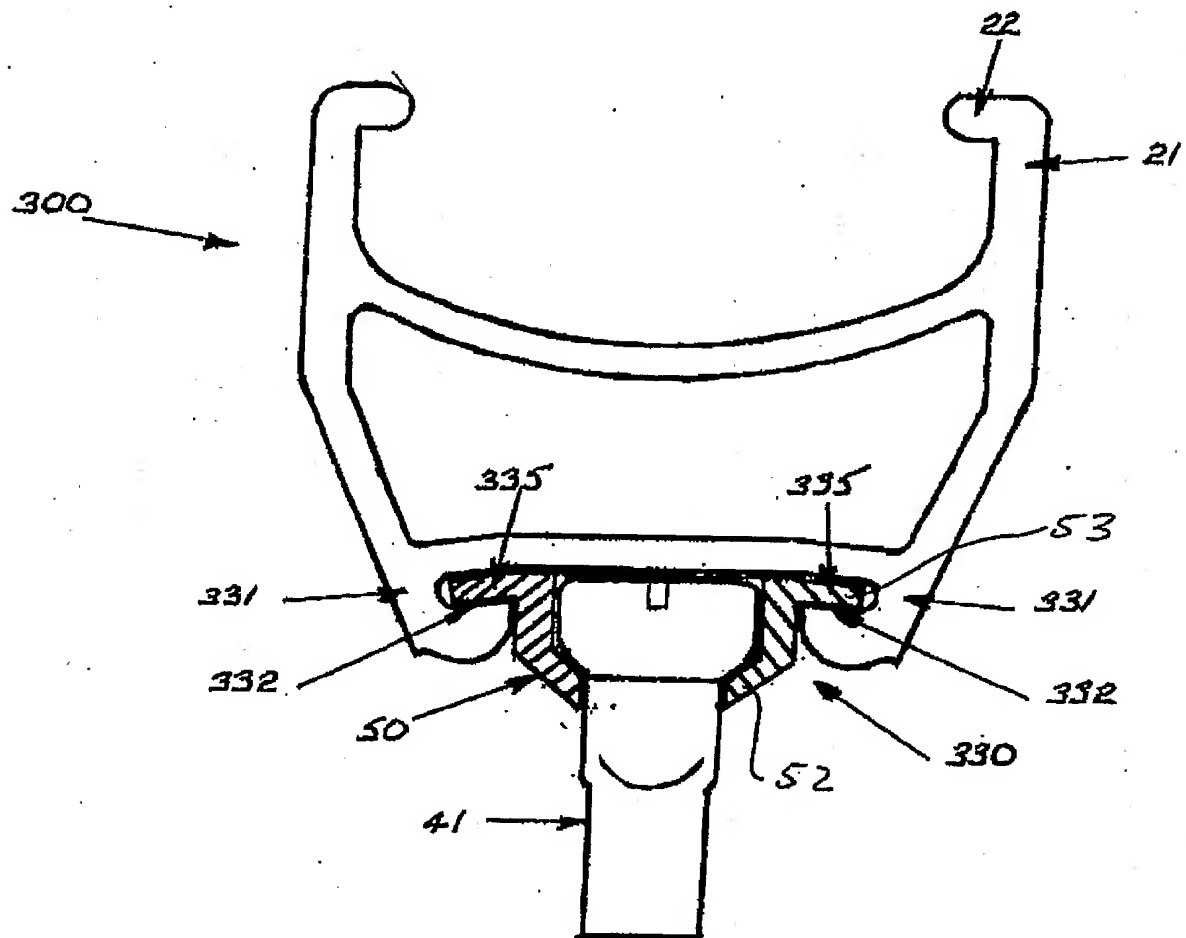


FIG. 4

6/17

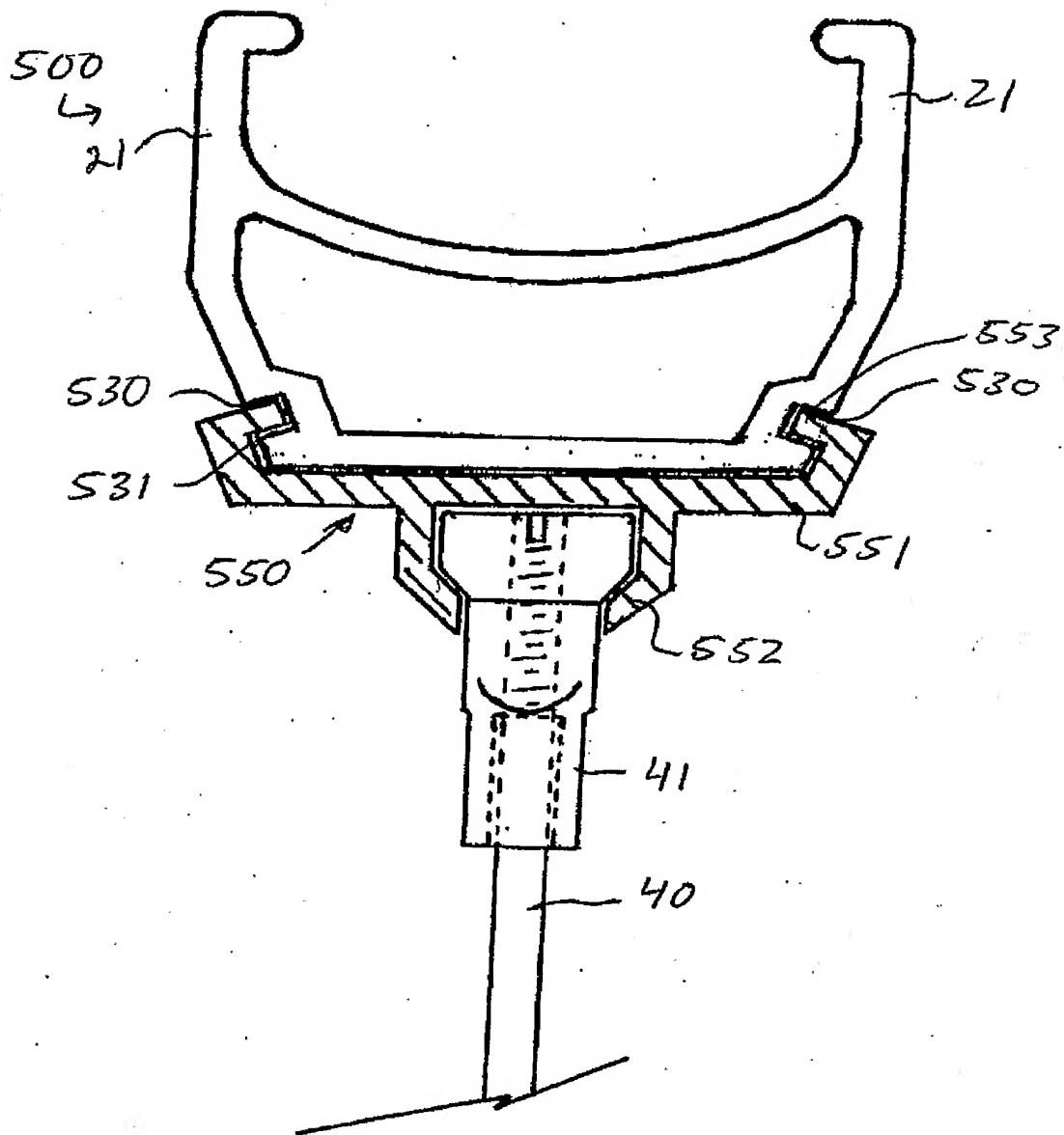


FIG. 5

7/17

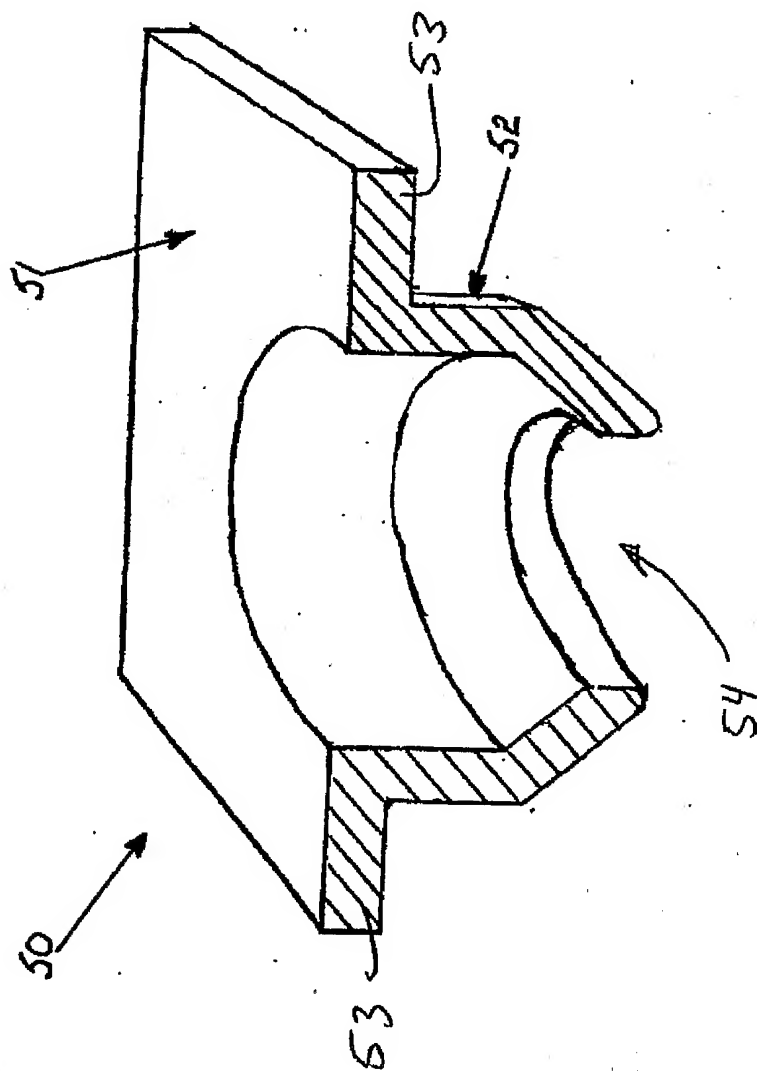


FIG. 6

8/17

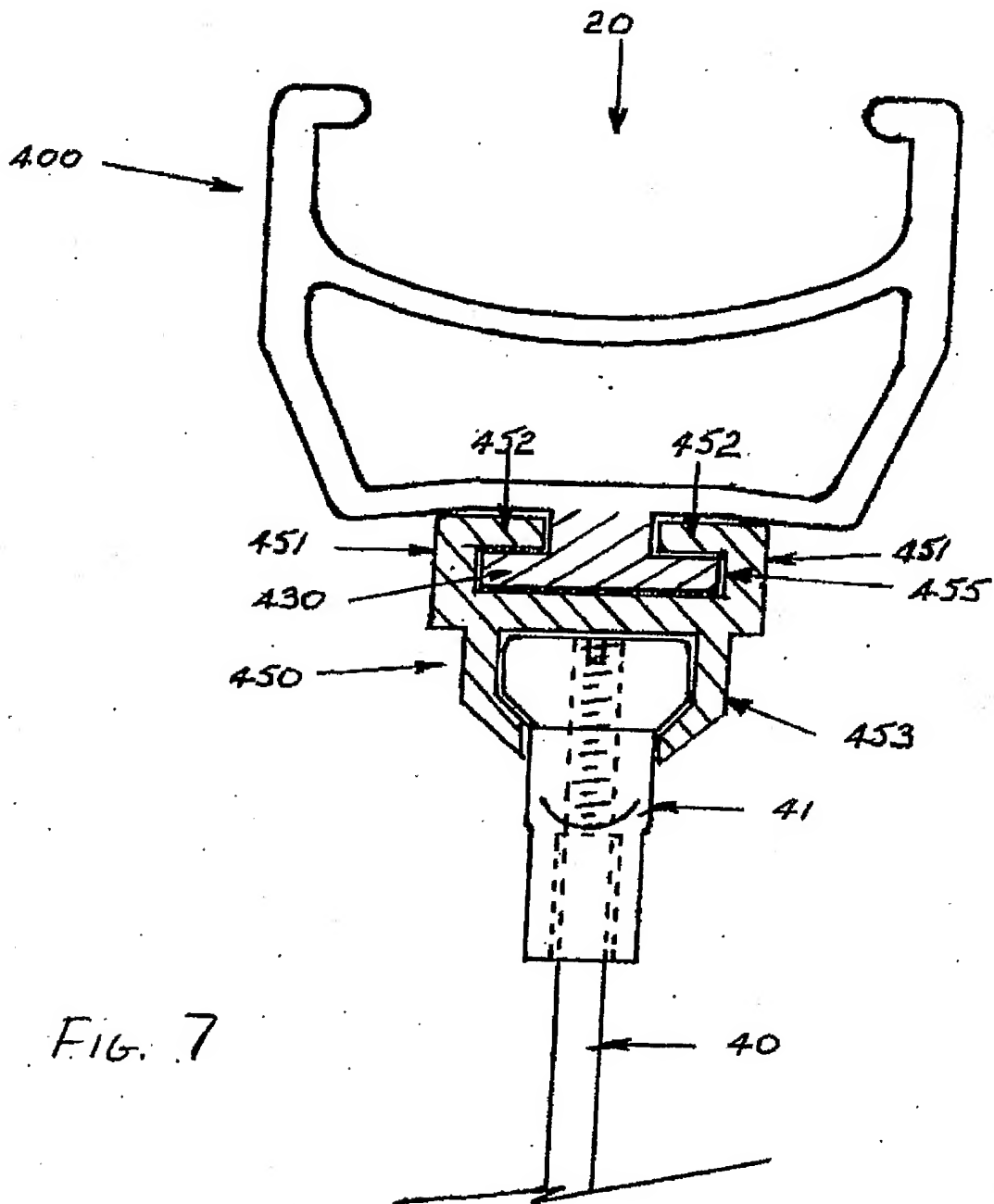


FIG. 7

9/17

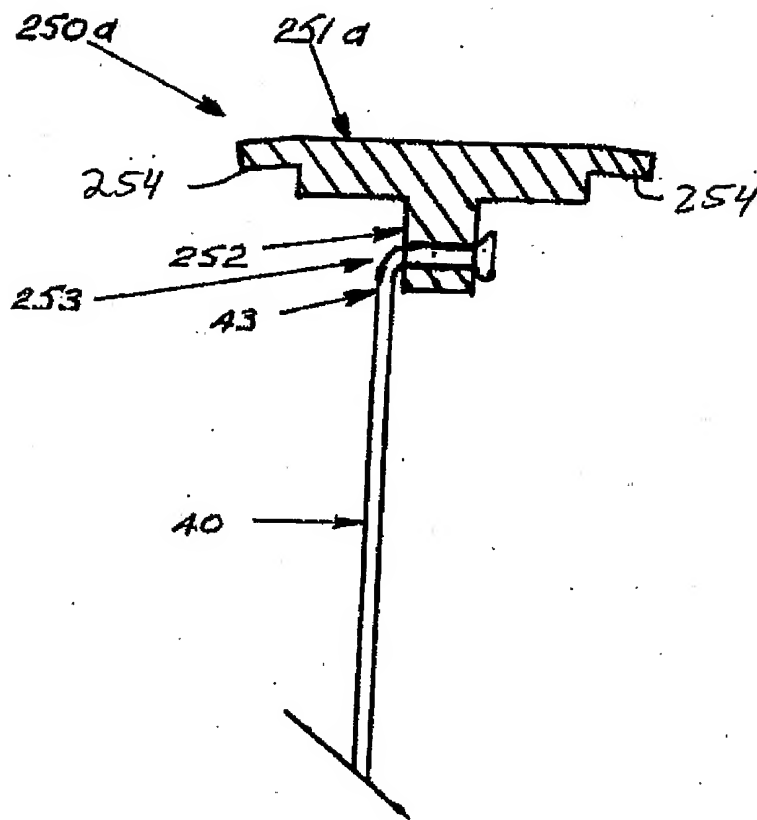


FIG. 8A



10/17

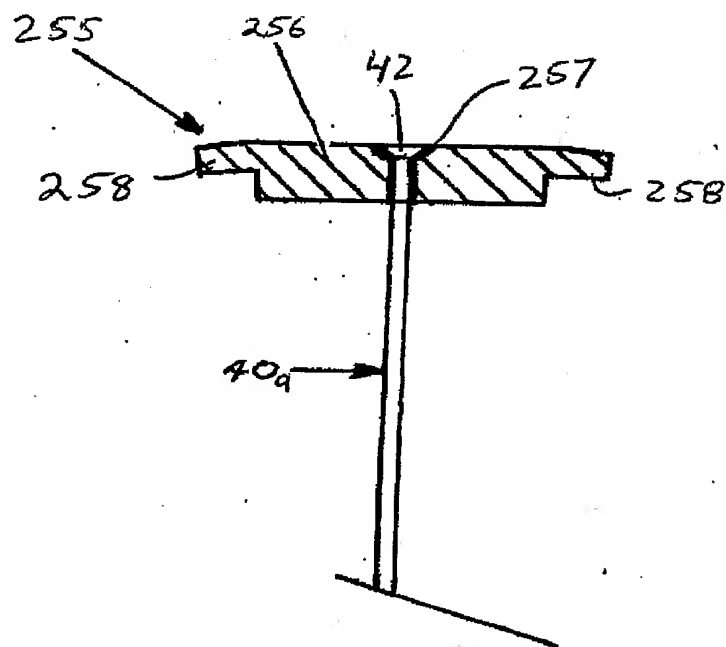


FIG. 8B

11/17

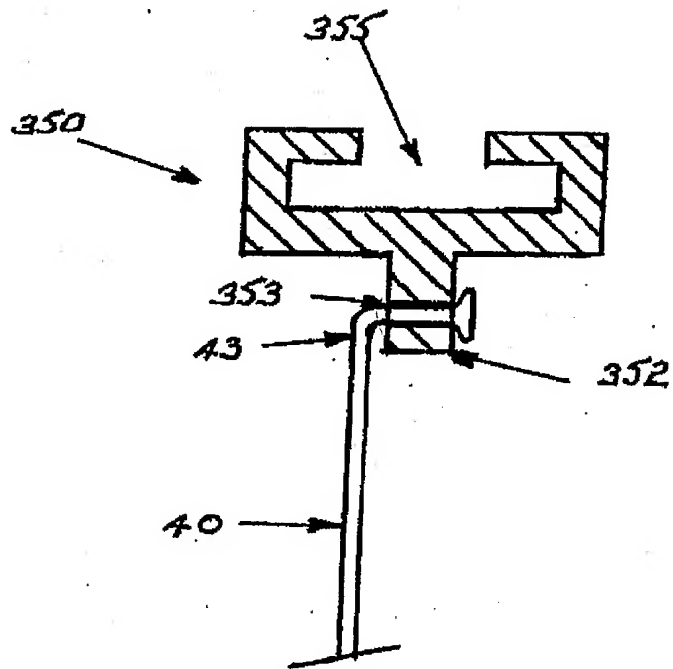


FIG. 9A

12/17

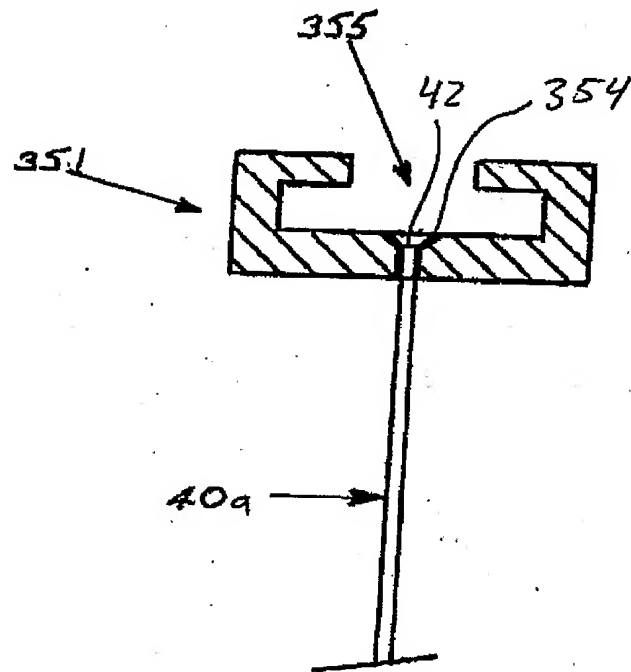


Fig. 9B

13/17

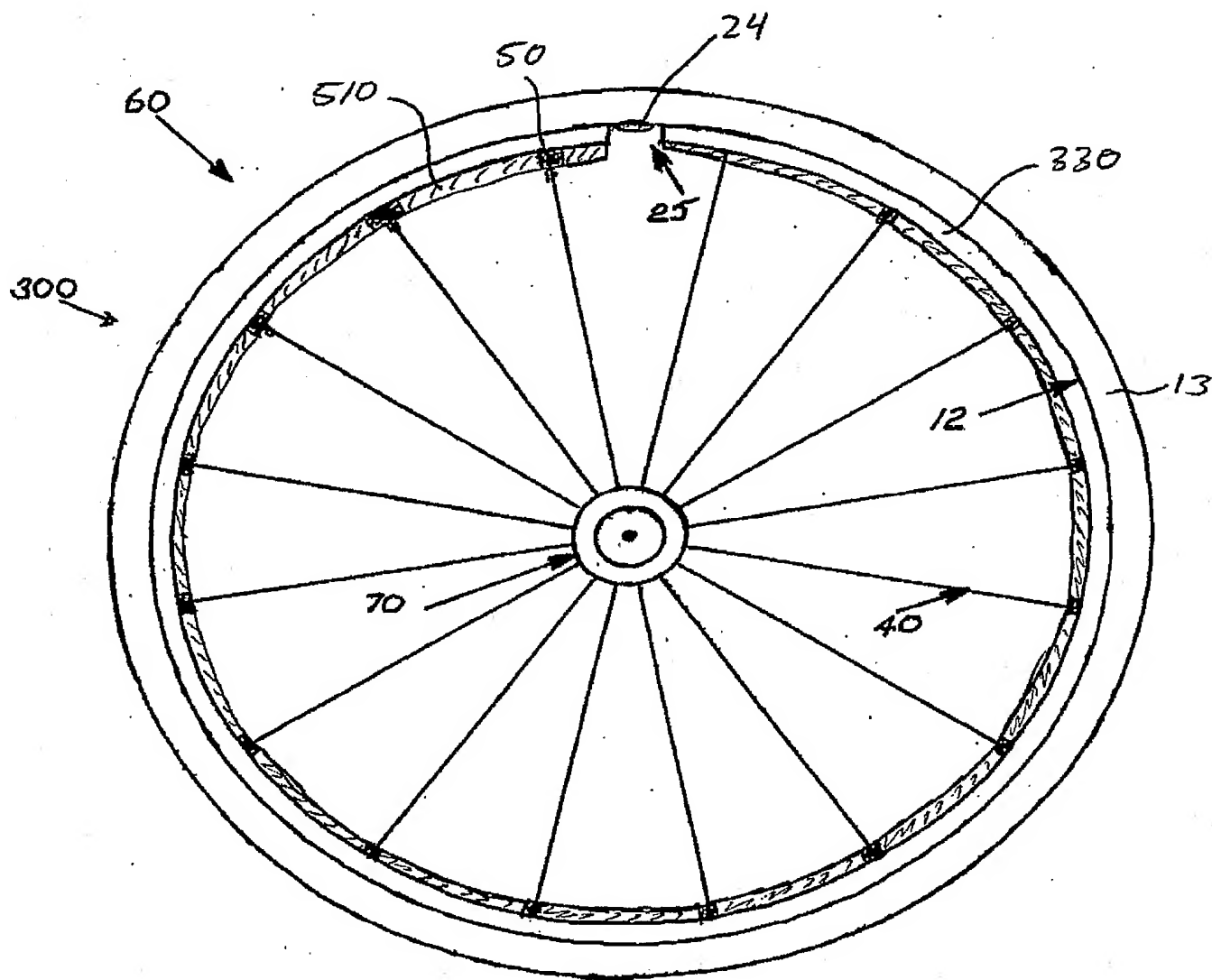


FIG. 10A

14/17

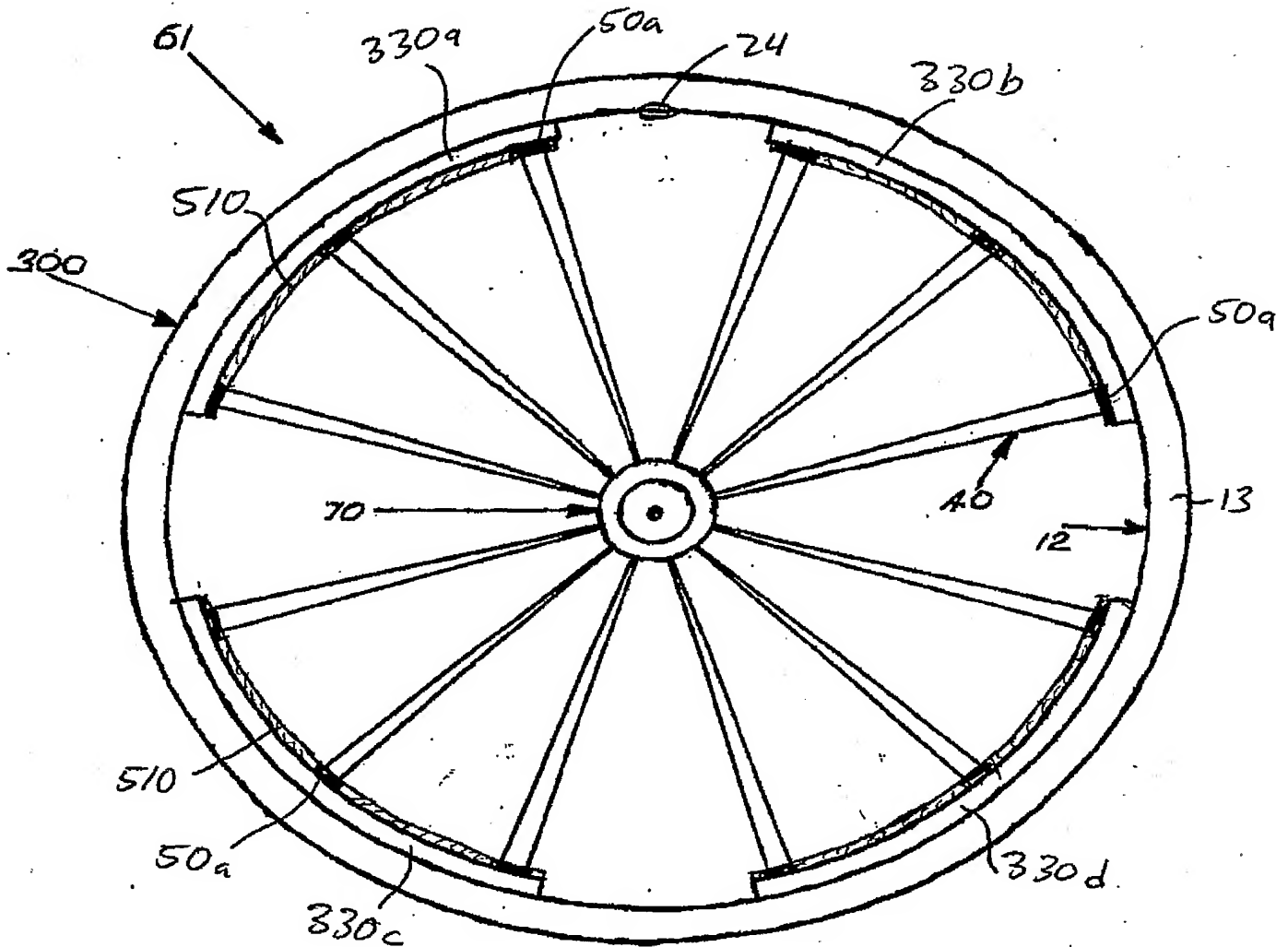


FIG. 10B

15/17

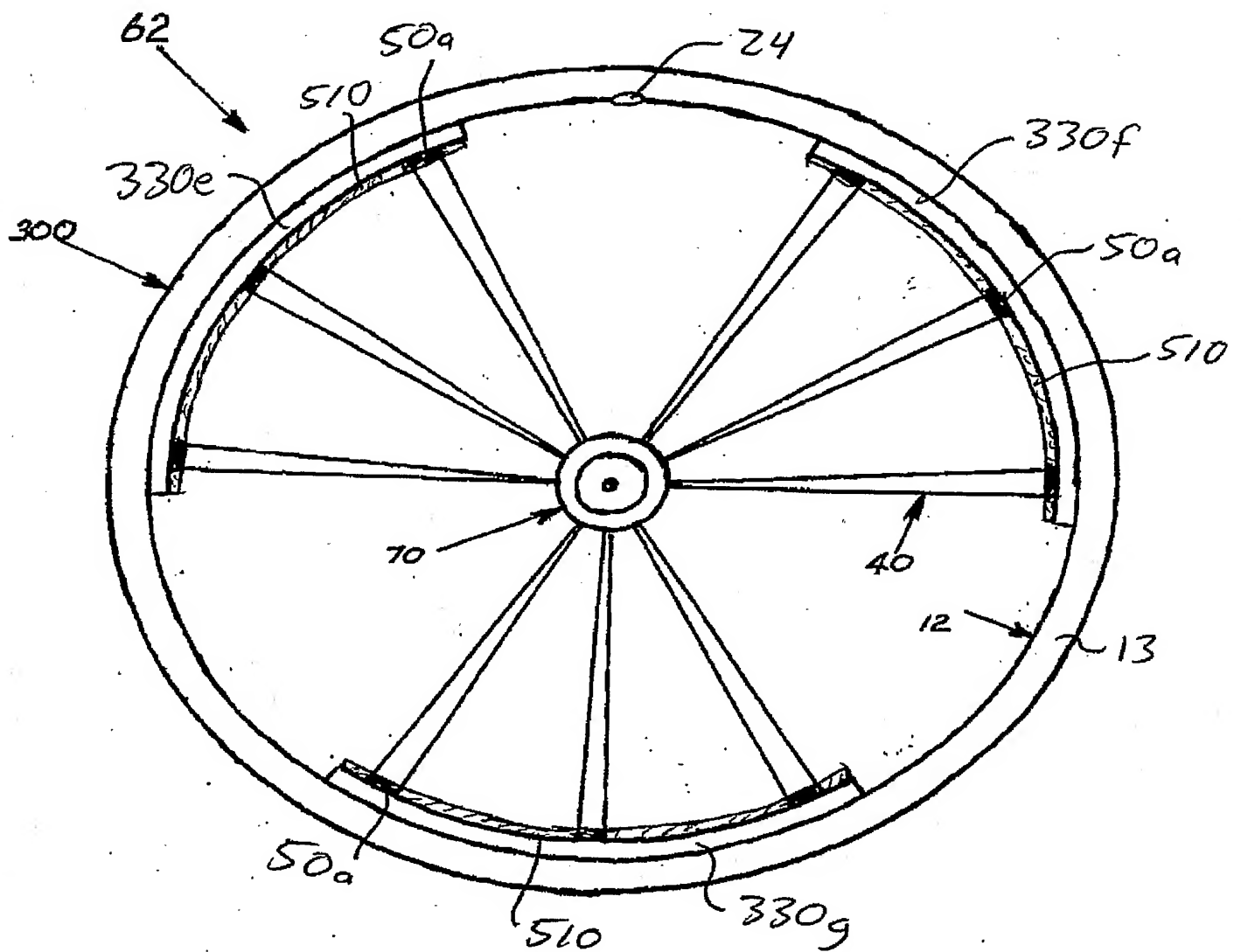


FIG. 10C

16/17

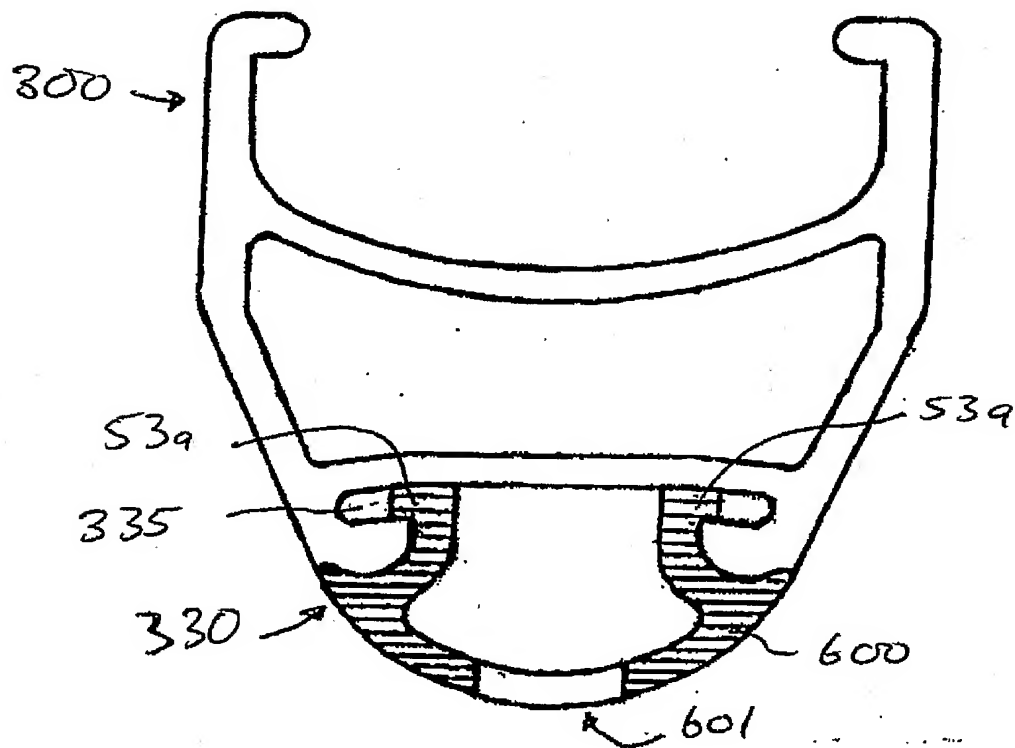


FIG. 11A

17/17

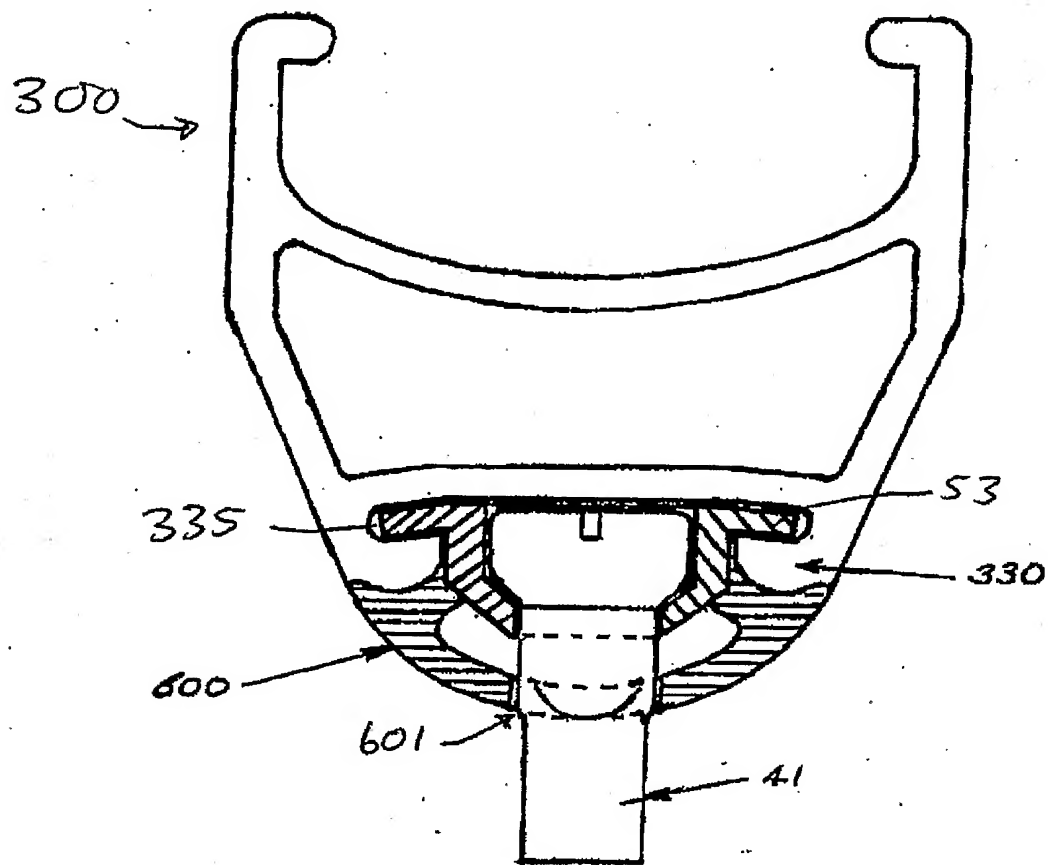


FIG. 11B